

Form PTO 1449 US Department of Commerce Patent and Trademark Office	ATTY DOCKET NO: P-IX 3536	SERIAL NO. 09/339,922
	APPLICANT: Huse and Wu	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT	FILING DATE: June 24, 1999	GROUP ART: 1643 644

U.S. PATENT DOCUMENTS

EXAM. INITIALS	DOCUMENT NUMBER	DATE	NAME	CLASS	SUB- CLASS	FILING DATE
MB	5,753,230	5/19/98	Brooks et al.	424	158.1	—

FOREIGN PATENT DOCUMENTS

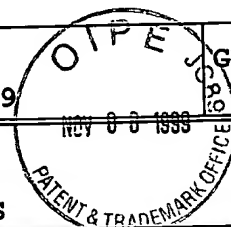
EXAM. INITIALS	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB- CLASS	TRANSLATION (YES/NO)

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FOREIGN PATENT DOCUMENTS

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OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages)

<i>me</i>	Wu et al., "Stepwise <i>in vitro</i> affinity maturation of Vitaxin, an $\alpha_v\beta_3$ -specific humanized mAb," <u>Proc. Natl. Acad. Sci. USA</u> , 95:6037-6042 (1998).

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EXAMINER <i>Samra 6/25/01</i>	DATE CONSIDERED
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Form 1449 OCT 01 1999 PATENT & TRADEMARK OFFICE	US Department of Commerce Patent and Trademark Office	ATTY DOCKET NO: P-IX 3536	SERIAL NO. 09/31/92
	INFORMATION DISCLOSURE STATEMENT BY APPLICANT	APPLICANT: Huse and Wu	FILING DATE: June 24, 1999
		GROUP ART: 1643-1644	TECH CENTER 1600/2900

U.S. PATENT DOCUMENTS

EXAM. INITIALS	DOCUMENT NUMBER	DATE	NAME	CLASS	SUB- CLASS	FILING DATE
PC	5,225,539	07/06/93	Winter, Gregory P.	536	387.3	—
I	5,264,563	11/23/93	Huse, William D.	536	25.3	—
	5,523,388	06/04/96	Huse, William D.	536	22.1	—
	5,573,230	5/19/98	Brooks et al.	424	158.1	—
	5,578,704	11/26/96	Kim et al.	530	388.22	—
	5,585,089	12/17/96	Queen et al.	424	133.1	—
	5,693,762	12/2/97	Queen et al.	530	387.3	—

FOREIGN PATENT DOCUMENTS

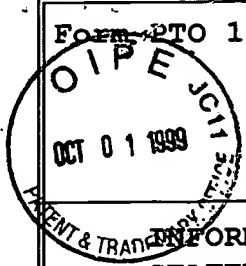
EXAM. INITIALS	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB- CLASS	TRANSLATION (YES/NO)
	0 451 216 B1	10/16/91	Europe	C12P21	08	—
	0 682,040 A1	11/15/95	Europe	C07K16	46	—

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages)

	Brooks et al., "Integrin α V β 3 Antagonists Promote Tumor Regression by Inducing Apoptosis of Angiogenic Blood Vessels" <u>Cell</u> 79:1157-1164 (1994)
	Cheresh, D.A., "Human endothelial cells synthesize and express an Arg-Gly-Asp-directed adhesion receptor involved in attachment to fibrinogen and von Willebrand factor" <u>Proc. Natl. Acad. Sci. USA</u> 84:6471-6475 (1987)
M	Cheresh and Spiro, "Biosynthetic and Functional Properties of an Arg-Gly-Asp-directed Receptor Involved in Human Melanoma Cell Attachment to Vitronectin, Fibrinogen, and von Willebrand Factor" <u>J. Biol. Chem.</u> 262(36):17703-17711 (1987)

EXAMINER GAMBER 6/25/01	DATE CONSIDERED
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MG	Choi et al., "Inhibition of neointimal hypersplasia by blocking $\alpha V\beta 3$ integrin with a small peptide antagonist <u>GpenGRGDSPCA</u> " <u>J. Vascular Surg.</u> , 19:125-134 (1994) ✓
RG	Chothia et al., "Canonical Structures for the Hypervariable Regions of Immunoglobulins" <u>J. Mol. Biol.</u> 196:901-917 (1987) ✓
MG	Clark, M. (ed.), "Protein Engineering of Antibody Molecules for Prophylactic and Therapeutic Applications in Man," Nottingham, England: Academic Titles (1993) ✓
MG	Day, E.D., <u>Advanced Immunochemistry</u>, Second Ed., Wiley-Liss, Inc., New York, NY (1990) ✓
RG	Devlin et al., "Random Peptide Libraries: A Source of Specific Protein Binding Molecules" <u>Science</u> 249:404-406, (1990) ✓
	Foote and Milstein, "Kinetic maturation of an immune response" <u>Nature</u> 352:530-532 (1991) ✓
	Glaser et al., "Antibody Engineering by Condon-Based Mutagenesis in a Filamentous Phage Vector System" <u>J. Immunol.</u> 149:3903-3913 (1992) ✓
	Huse, W.D., "Combinatorial Antibody Expression Libraries in Filamentous Phage" In: <u>Antibody Engineering: A Practical Guide</u> , C.A.K. Borrebaeck, ed. W.H. Freeman and Co., Publishers, New York, pp. 103-120 (1991)
	Huse et al., "Application of a Filamentous Phage pVIII Fusion Protein System Suitable for Efficient Production, Screening, and Mutagenesis of F(ab) Antibody Fragments" <u>J. Immunol.</u> 149:3914-3920 (1992) ✓
	Huston et al., "Antigen Recognition and Targeted Delivery by the Single-Chain Fv" <u>Cell Biophysics</u> , 22:189-224 (1993) ✓
	Kabat et al., U.S. Dept. of Health and Human Services, "Sequences of Proteins of Immunological Interest" Volume 1 (1991)
	MacCallum et al., "Antibody-antigen Interactions: Contact Analysis and Binding Site Topography" <u>J. Mol. Biol.</u> 262:732-745 (1996) ✓
MG	Moore et al., "Directed evolution of <i>para</i> -nitrobenzyl esterase for aqueous-organic solvents" <u>Nature Biotechnology</u> 14:458-467 (1996) ✓

EXAMINER Gammel 6/25/01	DATE CONSIDERED
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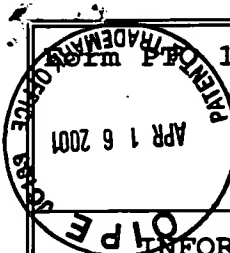
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT		FILING DATE: June 24, 1999	GROUP ART: 1644 1643

16	Padlan, Eduardo A., "A Possible Procedure For Reducing the Immunogenicity of Antibody Variable Domains While Preserving Their Ligand-Binding Properties" <u>Molecular Immunol.</u> 28(4/5):489-498 (1991) →
1	Plückthun and Skerra, "Expression of functional antibody Fv and Fab fragments in <i>escherichia coli</i> ," <u>Meth. Enzymol.</u> 178:497-515 (1989)
	Rader et al., "A phage display approach for rapid antibody humanization: Designed combinatorial V gene libraries" <u>Proc. Natl. Acad. Sci.</u> 95:8910-8915 (7/1998)
	Sandberg and Terwilliger, "Engineering multiple properties of a protein by combinatorial mutagenesis" <u>Proc. Natl. Acad. Sci.</u> 90:8367-8371 (1993)
	Singer et al., "Optimal Humanization of 1B4, an Anti-CD18 Murine Monoclonal Antibody, is Achieved by Correct Choice of Human V-Region Framework Sequences" <u>J. Immunol.</u> 150(7):2844-2857 (1993)
	Yelton et al., "Affinity Maturation of the BR96 Anti-Carcinoma Antibody by Condon-Based Mutagenesis" <u>J. Immunol.</u> 155:1994-2004 (1995)
N	Rosok et al., "A Combinatorial Library Strategy for the Rapid Humanization of Anticarcinoma BR96 Fab" <u>J. Biol. Chem.</u> 271:22611-22618 (1996)

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FOREIGN PATENT DOCUMENTS

EXAM. INITIALS	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB- CLASS	TRANSLATION (YES/NO)
PL	WO 95/25543	28.9.95	PCT			
W	WO 96/40250	19.12.96	PCT			
W	WO 98/33919	06.08.98	PCT			


OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages)

PL	Alfthan, <u>Biosensors and Bioelectronics</u> , "Surface plasmon resonance biosensors as a tool in antibody engineering," 13:653-663 (1998). ✓
	Biedler, C., "Mammalian expression and characterization of a dimeric single chain antibody specific for integrin alpha-v-beta-3," <u>Immunotech.</u> , 2:297 (1996). ✓
	Chowdhury et al., "Improving antibody affinity by mimicking somatic hypermutation in vitro," <u>Nature Biotech.</u> , 17:568-572 (1999). ✓
	Davies et al., "Affinity improvement of single antibody VH domains: Residues in all three hypervariable regions affect antigen binding," <u>Immunotech.</u> , 2:169-179 (1996). ✓
	Dueñas et al., "Selection of Phage Displayed Antibodies Based on Kinetic Constants," <u>Molec. Immunol.</u> , 33(3):279-285 (1996). ✓
W	Foote and Milstein, "Kinetic maturation of an immune response," <u>Nature</u> , 352:530-532 (1991). ✓

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	Rader et al., "A phage display approach for rapid antibody humanization: Designed combinatorial V gene libraries," <u>Proc. Natl. Acad. Sci. USA</u> , 95:8910-8915 (1998).
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PG		Adams et al., "Increased Affinity Leads to Improved Selective Tumor Delivery of Single-Chain Fv Antibodies," <u>Cancer Res.</u> , 58:485-490 (1998).
		Hawkins et al., "Selection of Phage Antibodies by Binding Affinity, Mimicking Affinity Maturation," <u>J. Mol. Biol.</u> , 226:889-896 (1992).
		Myszka et al., "Kinetic analysis of a protein antigen-antibody interaction limited by mass transportation on an optical biosensor," <u>Biophys. Chem.</u> , 64:127-137 (1997).
		Newman et al., "'Primatization' of Recombinant Antibodies for Immunotherapy of Human Diseases: A Macaque/Human Chimeric Antibody Against Human CD4," <u>Biotechnol.</u> , 10:1455-1460 (1992).
		Schier et al., "Isolation of Picomolar Affinity Anti-c-erbB-2 Single-chain fv by Molecular Evolution of the Complementarity Determining Regions in the Center of the Antibody Binding Site," <u>J. Mol. Biol.</u> , 263:551-567 (1996).
M		Schier et al., "Isolation of High-Affinity Monomeric Human Anti-c-erbB-2 Single-chain Fv Using Affinity-driven Selection," <u>J. Mol. Biol.</u> , 255:28-43 (1996).

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----------------------------	-----------------

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PG	Schier and Marks, "Efficient in vitro affinity maturation of phage antibodies using BIAcore guided selections," <u>Hum. Antibod. Hybridomas</u> , 7:97-105 (1996).
NW	Thompson et al., "Affinity Maturation of a High-Affinity Human Monoclonal Antibody Against the Third Hypervariable Loop of Human Immunodeficiency Virus: Use of Phage Display to Improve Affinity and Broaden Strain Reactivity," <u>J. Mol. Biol.</u> , 256:77-88 (1996).

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